Fairfax Collegiate
2026 Summer Program
3D Printing Course Syllabus
Rising Grades 4-6

Course Description

Design and print 3D objects.

Print nameplates, chess pieces, natureinspired models, scanned objects, and small structures.

Set up, adjust, operate, and maintain 3D printers, and prepare model files.

Students in 3D Printing understand the technology behind modern 3D printers and how to turn their ideas into solid objects. Class activities blend clear demonstrations with guided practice, giving students a solid introduction to the full printing pipeline from preparing files to running successful prints.

Students learn how their printers operate, how to set them up and maintain them, and how to prepare model files using beginner-friendly design software. They experiment with slicing settings, explore basic modeling tools, and try out multiple themed design challenges such as creating nameplates, custom chess pieces, nature-inspired models, scanned objects, and even small structures. In addition to completing several prints, they also gain confidence in troubleshooting, file preparation, and fine-tuning printer settings to match the characteristics of their models. Fairfax Collegiate provides a class set of 3D printers for students to use and provides each student with a laptop.

By the end of the course, students take home 6-8 printed objects they created or customized and will retain access to their digital designs. They leave ready to explore 3D printing independently, try more advanced modeling tools, or apply their new technical skills to other areas of STEM and technology.

Learning Objectives

Course Goals	**Learning the Design Process:** Students become accustomed to the multi-stage process of converting ideas into products, and the designing, prototyping, and redesigning that are inherent along the way. **Meeting Design Specifications:** Students create products to fit specific, predetermined criteria, and gain experience making optimizations within their bounds.

	Invention: Students gain confidence in their ability to creatively design and invent new things, or make innovative modifications to existing designs.
Course Topics	**Demystifying 3D Printing:** Students learn the inner workings of the hardware and software of the 3D Printing design pipeline, deobfuscating the process from CAD to physical object. **Mathematical Understanding:** Students grow accustomed to conceptualizing and designing objects in 3-dimensional (x, y, z) space. **Ethical Consideration:** Students develop a thoughtful consideration for the ethical questions and impacts associated with commonplace 3D printing technology. **Software Skills:** Students learn to use relevant tools in the form of Tinkercad and other design software. **Confidence in Troubleshooting:** Students are given direct (but supervised) agency in determining where mistakes were made and how to rectify them, building technical independence. **Design Challenges:** Students create products to address specific design challenges. **Marketing:** Students pitch products for faux-investor approval, designing presentations and answering questions to demonstrate a thorough understanding of their product.

Course Schedule

Class Meeting 1	**Introductory Topics:** Students are familiarized with the basics of 3D Printing, as well as the fundamentals of the design process. **3D Printer Upkeep and Maintenance:** Students learn about how to take care of their machines. **Sample Print:** Students learn the process of printing an object in .gcode form. **Introduction to 3-D Design:** Students explore a mathematical overview of design in 3-D space. **Tinkercad Tutorial:** Students complete an introductory tutorial to TinkerCAD.
Class Meeting 2	**Printer Setup:** Students ensure the printers are ready after setting them up. **Introduction to GCode:** Students learn the basics of GCode, the machine code for the printer. **Tinkercad Lessons:** Students learn more advanced tools for working with Tinkercad.
Class Meeting 3	**Introduction to Cura:** Students learn how to slice with Cura. **Full Print, Start to Finish:** Students step fully through the 3D Design and print process. **Replicating an Object:** Students recreate existing designs from memory. **Design Challenge: Nameplate:** Students design a desk object with their name on it, as an introductory design challenge.

Class Meeting 4	**Printing Objects:** Students print out objects from their past designs. **Learning Cura:** Students learn some of the finer details of working with Cura. **Design Challenge: Chess Piece:** Students design a custom chess piece.
Class Meeting 5	**Printing Objects:** Students print out objects from their past designs. **Pros and Cons of 3D Printing:** Students learn about some of the physical limitations of 3D printing. **Design Challenge: Nature:** Students make a design inspired by the natural world. **Printer Upgrades:** Students research enhancements they can make to the printing experience.
Class Meeting 6	**Printing Objects:** Students print out objects from their past designs. **Scanning:** Students scan, modify, and replicate everyday objects. **Design Challenge: Cities:** Students design an object to fit a booming metropolis.
Class Meeting 7	**Printing Objects:** Students print out objects from their past designs. **Painting and Finishing:** Students stylize their objects. **Design Challenge: Refactoring:** Students modify a previous design.
Class Meeting 8	**Printing Objects:** Students print out objects from their past designs. **Ethics of 3D Printing:** Students have a discussion about topical questions in the field of 3D Printing. **Design Challenge: Problem Solving:** Students work in groups to design, print, and test solutions to a given design challenge. **Painting and Finishing:** Students stylize their objects.
Class Meeting 9	**Printing Objects:** Students print out objects from their past designs. **Bridge Building Competition:** Students design, print, and test their own bridges. **Bridge Building Competition:** Students design, print, and test their own bridges.
Class Meeting 10	**Shark Tank:** Students research, design, and "pitch" their own inventions to the teacher, mimicking the popular television series of the same name. **Shark Tank:** Students research, design, and "pitch" their own inventions to the teacher, mimicking the popular television series of the same name.